

## The International Society for the History of Philosophy of Science *NEWSLETTER*

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## HOPOS 2010 in Budapest

This Thursday, June 24, the Eighth Biennial Congress of HOPOS will commence in Budapest, Hungary, at the Central European University. We congratulate the program committees, headed by Jim Lennox and Martin Carrier, and the local organizers led by Karl Hall and Gábor Zemlén for their preparatory work. The conference will feature 118 papers over four days, as well as three plenary addresses by John Losee, Rose-Mary Sargent, and Friedrich Steinle. Readers interested in more detail can find a full program and a wealth of other information on the conference website at <http://www.hopos2010.ceu.hu/>.

### FROM THE EDITOR

There is much news of note to Hopoi in the air. This issue finds us on the cusp of the Eighth HOPOS Congress in Budapest, described elsewhere on this page, and excitedly awaiting the first issue of the new scholarly journal of the organization. Journal editor Rose-Mary Sargent gives us an introduction to this new addition to HOPOS media and an initial solicitation of contributions, beginning on page 2.

We are also pleased to feature seven full-length book reviews in this issue, as detailed at left. Given the advent of a book review section in the *HOPOS* journal, these reviews will also be our last. Beginning with the next issue, the newsletter will migrate instead to new content and continue to serve as a medium for organizational news. A brief article on the next page includes some reminders and suggestions about how interested readers can participate in newsletter and website content. All are encouraged to consider joining in the ongoing development of HOPOS media!

Cheers to *HOPOS*, the journal! And best of times to those of you heading to Budapest!

*The Editor – June 22, 2010*

## Announcing *HOPOS: The Journal of the International Society for the History of Philosophy of Science*

At long last HOPOS has its own journal. Published by the University of Chicago Press, the first issue is scheduled to appear Spring 2011 in both print and electronic formats.

The editors invite submission of article-length manuscripts to be published in *HOPOS: The Journal of the International Society for the History of Philosophy of Science*.

You can find information on the journal at:

<http://www.journals.uchicago.edu/toc/hopos/current>

For submission of papers, please go to the tab For Authors and choose Instructions for Authors from the drop down menu for directions on how to prepare your manuscripts for submission. You may submit a paper either by clicking on the link embedded in the instructions page or by choosing 'submit manuscript' from the drop down menu.

HOPOS will be using the Editorial Manager Web site for submission and peer review. You may also register directly on EM without submitting a paper

by logging on to <http://www.editorialmanager.com/hopos/> and following the instructions there. It would be most helpful at this early stage if members who would like to volunteer as peer reviewers register there and indicate their areas of expertise.

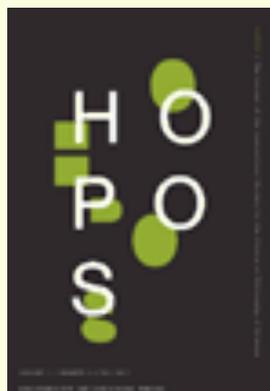
We seek to publish highest-quality scholarship concerning the history of philosophical discussions about science. The history of philosophy of science is broadly construed to include topics in the history of related disciplines, in all time periods and all geographical areas, using diverse methodologies. The journal aims to:

- provide an outlet for interdisciplinary work
- increase the already unusually high level of participation of international scholars in the history of the philosophy of science
- raise the level of work in the history of philosophy of science by publishing scholarship that helps to explain the links among philosophy, science, and mathematics, along with the social, economic, and political context, which is indispensable for a genuine understanding of the history of philosophy.

HOPOS scholarship is firmly concerned with situating philosophical understandings of science within the broader historical and philosophical settings in which they were developed, and against the backdrop of mainstream issues in philosophical

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### ***HOPOS: Journal of the International Society for the History of Philosophy of Science***



Semi-Annually from University of Chicago Press, Beginning Spring 2011  
<http://www.journals.uchicago.edu/toc/hopos/current>

Rose-Mary Sargent, Merrimack College – Editor

Menachem Fisch, Tel Aviv University – Co-Editor

Don Howard, University of Notre Dame – Co-Editor

Laura J. Snyder, St. Johns University – Co-Editor

Warren Schmaus, Illinois Institute of Technology – Book Review Editor

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thought, covering epistemological, methodological, metaphysical, and moral issues relevant to the growth of our knowledge of the world and human nature.

The journal does not limit submissions to HOPOS members. Scholars from all related disciplines are encouraged to submit to the journal. The length of articles is flexible, and all articles published in *HOPOS* are peer reviewed.

*HOPOS* does not consider unsolicited book reviews, but if you would like to be considered for a future review, please contact Warren Schmaus, Book Review Editor, at [hoposreviews@iit.edu](mailto:hoposreviews@iit.edu). All other editorial correspondence should be sent to Rose-Mary Sargent, Editor, at [rsargent@merrimack.edu](mailto:rsargent@merrimack.edu).

*Rose-Mary Sargent*  
Editor, *HOPOS*  
*Merrimack College*

## HOPOS Book Reviews

As of our next issue, the HOPOS Newsletter will no longer feature critical book reviews. Such reviews will instead appear in our new scholarly journal, also called *HOPOS*.

Readers interested in assisting the organization by contributing to the book review section of the journal, and publisher representatives wishing to submit books for review, should contact the *HOPOS* Book Review Editor, Warren Schmaus, at [schmaus@iit.edu](mailto:schmaus@iit.edu).

Book review inquiries directed to the newsletter editor will be forwarded to Prof. Schmaus for a limited transition period.

## Reminders about HOPOS Website & Newsletter Features

Given the advent of the society's new journal and online improvements introduced in 2008, the form of this newsletter is in transition. Not only will critical book reviews move to the *HOPOS* journal effectively immediately, but also most timely news of the profession can now be found at [www.hopos.org](http://www.hopos.org) in the Announcements section.

Readers wishing to post announcements of events and positions in the field can do so by way of online form pages that can be found at <http://www.hopos.org/announcements>. Announcements submitted online will also be posted to the HOPOS\_L listserv, and will be archived permanently for historical reference.

In place of this former content, the Newsletter seeks other contributions for News of the Profession – such as brief retrospective summaries of important events in the field, or reviews of important resources for research. In particular, we seek authors to contribute digest articles on particular major figures in the philosophy of science, detailing central secondary literature, research archives, and other major sources to find scholarly information on these philosophers. More information on this proposed series of ‘State of the Art’ essays can be found online at [www.hopos.org/commissions.html](http://www.hopos.org/commissions.html).

The Newsletter will also continue to publish notices of new books in print and singular developments in the field. These features will return in our next issue, slated for the end of 2010.

*The Editor*

## BOOK REVIEWS

***The Cambridge Companion to Galen.* R. J. Hankinson, editor. Cambridge University Press: Cambridge, 2008. xxi+450 pp. Hardback (\$85, ISBN 978-0521819541), Paperback (\$30, ISBN 978-0521525589).**

It might initially surprise some readers to find a volume on Galen in a series devoted to philosophers. There is no doubt that Galen exerted a directing influence upon European medicine for nearly 1500 years after his death, and many of his works are still readily available in modern translation. Galen wrote extensively on a wide variety of subjects associated with physiology or medicine, and our knowledge of medicine in antiquity is largely derived from his writings and those of Hippocrates: together their extant works constitute a larger corpus than any other area of Graeco-Roman writing. On the other hand, many readers would not immediately associate “philosophy” with his name.

This volume of fourteen essays by eleven authors aims to correct this misperception. Galen was active at a time long before technology of various kinds had supplanted much of the human decision-making involved in the practice of medicine. The modern physician can be satisfied with answering the question of the type: “What do we know about the human body in health and disease?” Galen’s dependence upon direct observations and his own judgement necessitated, however, that more fundamental questions also be addressed, such as “What *can* we know about the human body? What distinguishes secure knowledge from conjecture, opinion and prejudice?” – all philosophical questions, and issues which divided the various medical “schools” extant during Galen’s long life (and for information about which we are largely reliant upon Galen’s discussions of their positions). It is thus natural that Galen concerned himself with the methodology of both experimental physiological and medical decision-making: the practising physician was reliant upon his knowledge and the correct application of this knowledge, and had

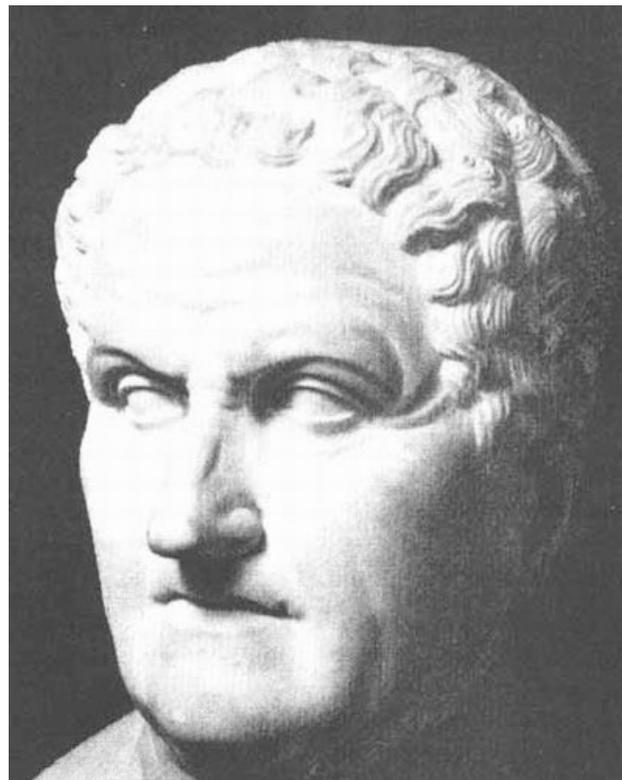
further to contend with the twin facts that his therapeutic options were quite limited, and that errors of judgement were very public in their consequences, potentially fatal.

From the standpoint of the 21st century it is difficult to envy the lot of physicians in ancient Rome. But Galen was incredibly successful in his time, and one of the achievements of this book is that Galen is presented as a man of his time, as a colorful and very human character. His vanity is understandable in light of his unsurpassed command of the entire spectrum of contemporary biomedical science, his intellectual prowess enhanced by his resolute consideration of the philosophy of not only medicine, but of knowledge itself. Here he diverged from the standpoint usually associated with his primary role model, Hippocrates, whose utilitarianism tended to deplore philosophical musings as inferior to diagnoses based on direct experience and historical precedents. Galen was of quite different opinion: he not only devoted a treatise specifically to the principle that the “best doctor is also a philosopher”, but also discussed “the composition of the art of medicine” and “medical definitions”, “how to recognize the best physician” and “medical experience”. “The best method of teaching” was also examined separately, and he even prepared ‘student guides’ in which he outlined the order in which his books should be read to achieve the greatest benefit; finally, and not surprisingly, given what we learn of his character in this volume, a book “on his own opinions” was also included amongst his writings. And this is apart from his prodigious output on every conceivable aspect of medicine and experimental physiology, including commentaries on Hippocrates as well as critiques of contemporary competitors – and the texts which fill a long shelf in a modern library do not include those lost to a catastrophic fire in 192, or those subsequently lost through any of a number of fates to which manuscripts (in the literal sense of hand-written ‘books’) are liable.

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The biomedical texts, most familiar to the majority of those acquainted with Galen's work, are treated well in the second half of the present volume by Julius Rocca (anatomy, particularly neuroanatomy), Armelle Debru (physiology), Philip J. van der Eijk (therapeutics) and Sabine Vogt (pharmacology), as well as an essay by Rebecca Fleming on Galen's commentaries on earlier authorities. Each essay provides a compact and, even for the uninitiated, accessible overview of the respective theme. Galen's medicine and physiology have been the subject of innumerable books and papers, including a number of valuable contributions by the authors of these chapters (although as van der Eijk notes, certain aspects of Galen's work, including his therapeutics, still await thorough academic discussion), but these chapters allow those previously unfamiliar with these themes – which probably includes a large number of readers of a “companion to philosophy” – to conveniently acquaint themselves with the physician's scientific work. The philosophy of medicine and medical practice, in any case, merits more attention than it generally receives, and the discussions here of the philosophical basis for Galen's medicine is as fundamental to his significance as his detailed descriptions of animal dissections. Indeed the fact that Galen was able to pursue the truth both as an investigative scientist and as a physician, two capacities with sometimes-divergent aspirations and approaches, contributed much to his lasting impact on Western medicine.

The present book commences, however, with chapters on Galen, the man and his work, and his reception by contemporaries, providing an excellent basis for the subsequent specialist chapters, as well as making understandable the reasons for his centuries-long eminence in European medicine. Galen combined assiduous observation, careful logic and – not least – political skill and showmanship in his pursuit of an ideal of medicine as a science that demanded unwavering loyalty to truth and recognition of the constant ways of Nature. This did not mean that his philosophy was advanced only by careful scientific explanation: public demonstrations of his prognostic skills marked by (as it appeared to



## **Galen (129-216 CE)**

the larger part of his audience) bold predictions, as well as polemic demolitions of competing medical approaches, were also part of his arsenal for establishing firm foundations for the practice of the healing arts.

Six chapters on more philosophical components of the Galenic corpus follow: methodology (Tien Teuleman), logic and language (both by Ben Morison), epistemology and philosophy of nature (R. J. Hankinson) and psychology (Pierluigi Donini). Once again, each essay is a well-constructed précis of a particular aspect of Galen's thought, particularly the two longer contributions by Morison. As a medical historian, I found these sections the most interesting in the volume, introducing in an attractive and coherent manner facets with which I was less familiar. Here we learn of Galen's sound grounding in both mathematics and philosophy of the Platonic-Aristotelian tradition, resulting in a rigorousness of

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thought which was nevertheless amenable to modification when confronted by the non-standardized behavior of patients in the real world, thereby skillfully sidestepping Hippocratic criticism of philosophy by physicians. For medicine to be a science it needed to be precise in its logic; for medicine to be effective, it needed to recognize and adapt to the variability of nature. I was certainly astonished by the length of the list of Galenic works concerned with logic (not all still extant), evidence of the importance Galen attached to this tool of reason. This and the chapter on language could have been profitably combined into one section (albeit almost one hundred pages long), as Morison's contribution on "language" is not so much concerned with linguistics as with the importance of precise definition of terms employed in logical processes. Morison discusses at length the arguments of Galen and others regarding the validity of names as labels, quasi an early juxtaposition of the concepts of signifier and the signified, but Galen's principle aim is not a philosophy a language, but rather the determination of criteria for establishing a standardized terminology for use in scientific medicine.

Morison's chapters flow gently into Hankinson's examination of Galen's views on the relationship between experience and reason, and of the limits of knowledge, both practical and theoretical. Central to Galen's scientific philosophy was that only a comprehensive understanding of the inner workings of a subject permitted predictions concerning this subject. He recognized the fallibility of human senses, but also that the application of reason to the data provided by the senses could eliminate much of their inherent uncertainty. In any case, the physician had no alternative: abstract hypothesizing about the construction of the world was acceptable for pure philosophers, the practicalities of the physician's vocation demanded, in contrast, continuous, honest contact with the vagaries of the material world. This also means that medicine must constantly evolve. It is ironic, in light of the slavish tautophony which would characterize the reception of Galen for the next ten centuries, that he demanded that the physician continue to observe, to listen and to reason

if the art of medicine were to be advanced: respect for revered authorities was one matter, parroting of their words despite evidence to the contrary, conversely, was betrayal of the project represented by scientific medicine.

Donini's brief chapter on "psychology" lacks only a more appropriate title, for the discussion here concerns Galen's concept of the nature of the soul, perhaps a literal interpretation of the word "psychology", but not reflecting what the term now represents. This is otherwise a useful depiction of the age-old struggle with reconciling materialist science and the *psyche*, further pursued in the following contribution.

Hankinson's chapter on "Galen's "philosophy of nature" is appropriately placed near the centre of the volume, for it includes a problematic area when considering Galenic medicine within the context of his otherwise non-speculative approach to medicine: the humoral model of human physiology, adopted from Hippocratic medicine but much elaborated by Galen himself into a complex system of qualities and temperaments. Hankinson carefully delineates the arguments advanced by Galen in favor of the existence of four elements and of four qualities, but concludes that "Galen clearly allows himself to go beyond what any reasonable inference from the phenomena [that he had discussed] should permit him to do" (p. 216). But it was on the basis of these quadrigae that Galen then developed the humoral theory that would long dominate medicine. Health for Galen was the ideal balance of the four qualities, and the well-trained, sensitive physician was capable of assessing the degree of these qualities in a patient. Hankinson notes the "strains" and "ad hoc" nature of many of Galen's assertions in his attempt to construct an overarching model of human physiology, but also that Galen, unlike many of his contemporaries with respect to their own speculative excursions, was aware of these problems. Further observations might refine his model, but Galen was skeptical about the possibility of an all-inclusive theory of everything derived from empirical data.

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Galen's view of Nature is that it was a well designed, harmonic system, but one that is impermeable to complete comprehension by human intellect.

The final chapter (by Vivian Nutton) delineates the reception of Galen and the adventurous paths by which his writings have reached us, whereby it is noted that recent discoveries of previously unknown (mostly medieval) manuscripts mean that "modern scholars are more familiar with Galen's works than were their predecessors in Byzantium and all but a handful of experts in the Islamic world" (p. 355). It would have been useful to read here more of the impact of successive transcription and translations upon both the content and reception of Galen's work. The neuropathologist Lewy<sup>1</sup> commented that many terms for brain structures did not reflect the meaning of their Greek roots, suggesting for example that "vermis" (see also p. 248 of this volume) might have arisen from mistranscription by a Syriac scribe of *skélos* ('thigh'; Galen likened the appearance of the periventricular region to that of upper legs) as *skólex* ('worm').

Appendices provide a useful guide to the various editions of the Galenic corpus, a listing of the major translations into modern languages, and a thorough bibliography. Hankinson, as editor, laments in the preface that a number of expected contributions failed to be contributed, but he should nonetheless be satisfied with the volume as it stands. Its size and readability make it an excellent handbook may be heartily recommended to any educated reader with an interest in ancient medical history or philosophy.

<sup>1</sup>Lewy, FH, 'Historical introduction: the basal ganglia and their diseases' in TJ Putnam, ed., *The diseases of the basal ganglia* (New York: Hafner Publishing Company, 1942), pp. 1-20.

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***Demonstration and Scientific Knowledge in William of Ockham. A Translation of "Summa Logicae" III-II: De Syllogismo Demonstrativo", and Selections from the Prologue to the "Ordinatio". John Lee Longeway. University of Notre Dame Press: Notre Dame, IN. 456 pp. Hardback (\$58, ISBN 978-0268033781).***

Prof. John Lee Longeway, associate professor at the University of Wisconsin (Parkside) has written an excellent book, very important and valuable for the scholar of scientific and philosophical thought in the Western Middle Ages. His translation of some important texts of William of Ockham, OFM (1285-1347): "Summa Logicae III-II: De Syllogismo Demonstrativo" and Selections from the Prologue to the "Ordinatio" is done with great respect for the literal sense and without any literary embossing.

Prof. Longeway has written also an invaluable Introduction about Ockham's place in the history of philosophy and science. This Introduction could also be utilized as a book in itself. Otherwise it is the first English translation of Ockham's Work on Aristotle's "Analytica Posteriora". This treatise of Aristotle is contextualized in the Latin Middle Age offering a detailed and rich view of its intellectual, philosophical and scientific milieu.

As we know, the Latin Middle Age flourished with great commentaries on the "Analytica Posteriora" (for example, from Robert Grosseteste, Albert the Great, Thomas Aquinas, Duns Scotus, Giles of Rome). Longeway's own research strongly links developments in medieval epistemology and theory of scientific demonstration to the nominalistic empiricism of William of Ockham. Studies and publications about scientific demonstration in the Middle Age are not as developed as some other aspects of the History of Philosophy and Science. The new book of Prof. Longeway offers a very important insight into the thought of Ockham and his crucial role in the construction of Western European empiricism. Science in Ockham is related always to a very original conception of knowledge and also of

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## **William of Ockham (1285-1347 CE)**

theology, distinguishing knowledge of God, Man and Nature. Here we can read the English version of the Tractate II, Part III of his “Summa Logicae” that is precisely concerning “On Demonstrative Syllogism” and also the translation of some selected texts of Ockham’s “Ordinatio” or “Scriptum in Librum Sententiarum” related to scientific demonstration.

These texts translated by Prof. Longeway (without the original Latin) were made from the Edition of Ockham’s Works published by the Franciscan Institute: for the “Summa Logicae” from the “Opera Philosophica” and for the “Ordinatio” from the “Opera Theologica” (vol.1). This first-rate book is enriched also with some Appendices where we can read texts from Gilles of Rome, the Hermit of S. Augustine and disciple of Aquinas; and John of Cornwall. As Longeway affirms in his Introduction, the study of these texts is very important and helpful

in understanding the problematic of Philosophy of Science, Epistemology and Metaphysics in the Western Latin Middle Age, and particularly in Ockham. Lacking the original Latin Text his literal translation allows the reader to take hold of the original meaning of the affirmations, propositions, demonstrations, etc., so characteristic of the medieval writers.

Ockham is, in the words of Longeway, “the founder of European empiricism” and his analysis of language based on logical premises is the groundwork of the critique of Plato present in his works. The experience of particulars is the starting point of any epistemological conception but at the same time there is no place in his system to a subjectivist point of view. To be precise, the texts translated and commented by Longeway are the conclusions of Ockham on the question of scientific demonstration. Therein, Ockham summarized his outstanding research emphasizing the unique and restricted value of mathematics as only valid paradigm of demonstration. Of course Longeway analyzes with a deep insight, the influence of Aristotle on Ockham and other medieval authors. “Analytica Posteriora” is the key work and particularly its first book concerned with our issue. And as it is well known, Aristotle declared that Demonstration is a Syllogism derived logically and formally from some first principles.

Ockham, following with personal wit the great Aristotelian tradition, wrote that the demonstration is not in itself (and “per se”) an original unity because it is set up from smaller parts. The structure of these parts must be understood before studying the demonstration. Otherwise, as it is at length explained by Longeway, Ockham’s philosophy of language is linked essentially to his metaphysics (as true of all the great medieval philosophers and theologians) - but not only to his metaphysics but also to his epistemology/gnoseology. For Ockham it is not possible to know universals because such universals

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don't have real existence and presence. We know only particulars but by means of universal concepts. This is related to the possibility of demonstration about demonstration, and the subject word. The subject is demonstration but it is necessary to construct it and so the syllogism/s = demonstration/s. The demonstration has therefore a nominal middle term with purpose and finality of knowledge.

Quoting Longeway, "Demonstrations are syllogisms productive of scientific knowledge", will turn out to be informative and will mean something like "those things men call demonstrations, with which you are already familiar and with which you can, in some cases, reliably distinguish from things that are not demonstrations, are syllogisms productive of scientific knowledge". In order to know this, one must know the intentions of those who form and make use of demonstrations" ("Introduction", p.127) Intention, finality/purpose and meaning are doubtless key-tools and concepts in the system of Ockham but structured basically around logic as the pattern of every science and possible form of human knowledge. Longeway enlightens us about how this personal conception keeps its eminent place during the Middle Ages in research and studies about the nature of knowledge, the value of logics and the presence of the knowing subject.

That notwithstanding, the central place is occupied by logics as science, technique and art. The reader could perceive without difficulty the eminent place of Ockham within those subtle discussions. The Latin term "scientia" used by Ockham and translated by "Knowledge" is very important in the texts of Ockham translated in this book. But "scientia" could be: a) A group of facts or events, necessary or contingents. For example "scientia" through sense perception; b) "scientia" could also has a more precise meaning as the plain grasp of a necessary truth. For Ockham the second meaning (b) supposes every time something establishes the trueness of the proposition. The conclusions of "Scientia" afterwards must be universal and true. Demonstrations are a constituent part of organized

sciences in order to get a "holistic" (excuse me for an anachronistic term) view of reality as such, without the limits of a relativistic subjectivism.

To read the Introduction (with very pedagogical tables and a critical bibliography) and Longeway's translation is a pleasant exercise for those people interested or engaged in philosophy and history of Science (first of all logics). However, in my opinion, it must always be necessary to refer to the original Latin text because any translation as literal as the present gives only a ballpark figure of the thought of Ockham and the other writers considered here.

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***Atomism in Late Medieval Philosophy and Theology.* Christophe Grellard and Aurélien Robert, editors. Brill: Leiden and Boston, 2009. x+250 pp. Hardcover (€99, ISBN 978-9004172173).**

The volume brings together nine articles, the majority of which are based on contributions to "Atomism and its Place in Medieval Philosophy"—an international workshop held at the *Maison Française d'Oxford* in late 2004—to which the editors have added a useful introduction and a bibliography. Despite its somewhat generic title the volume's objective is relatively well defined. First, it aims "to distinguish the singularity of fourteenth-century atomism compared to other periods; second, to show that the understanding of the debates over this period is far more complicated" than has previously been assumed. Third, as some of the articles "challenge the prevailing view about the mathematical nature of indivisibilism at that time," the volume seeks to question "whether fourteenth-century atomism is rather mathematical, physical or even metaphysical." The elusive nature of medieval

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atomism notwithstanding, the editors point at the inadequacy of the received historical account, which divides it into “Arabic theological atomism” and fourteenth-century indivisibilism. (p. 2).

Accordingly, in a more general sense, all the articles engage to some extent with the question whether “debates on atomism in the fourteenth century [were] purely mathematical and geometrical.” (p. 3).

Save for the first two chapters all the contributions focus on a particular fourteenth-century figure and are arranged chronologically, from Richard Kilvington (d. 1361) through the better known Nicolas of Autrecourt and William Crathorn to Blasius of Parma (d. 1416). The first article, by John E. Murdoch, offers a more general survey of the subject; the second, by Rega Wood, deals with Richard Rufus of Cornwall of the early thirteenth century. Since both of these chapters (Murdoch’s especially) are wider in scope, touching on some of the ‘greater questions’ related to fourteenth-century debates over atomism that figure in most of the other chapters, they serve as a background to the ensuing articles. And they do so in a significant way.

Since much of the “medieval discussions about indivisibles” (p. 9) are commonly considered as “a mere reaction to the rediscovery of Aristotle’s texts” in the twelfth and thirteenth centuries, Rega’s chapter on Rufus—among the first influential commentators of Aristotle and “author of the first known Western commentary on Aristotle’s *Metaphysics*” (p. 40)—sheds important light on the complexity, ambiguity, and even inconsistency of the Stagirite’s views on indivisibles. While the common source for medieval atomism is found in his *Physics*, especially bk. VI—in which Aristotle most famous rebuttal of indivisibles occurs—Wood also considers commentaries on other works like *De Anima* and the *Metaphysics*. Rufus is shown to have been largely in agreement with Aristotle on questions relating to the ontological (mathematical and physical) status of points; in the spirit of his times, however, Rufus faced a theological challenge in trying to “affirm that though one infinity does not extend beyond another, nonetheless one infinity can

be greater than another.” (p. 64).

Murdoch’s inaugural chapter occupies a special place, clearly signaled by the editors’ remark that the books’ focus on fourteenth-century atomism is meant “above all else to discuss Murdoch’s hypothesis, which is the prevailing one today.” (p. 3). The reference is to Murdoch’s longstanding study of the singular features of medieval atomism, commonly seen as a mere transition between Ancient and Renaissance (revivals of) atomism; more specifically, to Murdoch’s thesis that fourteenth-century atomism comprises a “response to Aristotle’s anti-atomism and never a return to Ancient theories.” (p. 5). The book’s bibliography features over fifteen contributions by Murdoch, representing close to half a century of scholarship. In his present chapter, however, Murdoch ventures to demonstrate how late medieval atomists and their critics transcended the “Aristotelian base” to provide “*new* conceptions and *new* arguments for their cause.” (p. 17).

In chapter 3 Elżbieta Jung and Robert Podkoński discuss the anti-atomist stance of Oxford philosopher Richard Kilvington, exploring his “geometric proofs of the infinite divisibility of a continuum.” (p. 65). The geometrical approach was of course a commonplace, evidenced in the lineage of Duns Scotus, William Ockham, and Thomas Bradwardine, and stretching back to Avicenna. (p. 66). The authors, however, focus on Kilvington’s unconventional critique of indivisibilism, which they show to have been developed with little concern for the orthodox contemporary sources. Three of his proofs are examined: concerning the angle of tangency, the evolution of a triangle in a ‘cone of shadow’, and the possibility of an infinite line. The main point, in the context of the volume, is that although an advocate of infinite divisibility “Kilvington is not really concerned with confutation of atomism,” as the editors aptly note. (p. 10).

The following five chapters (4-8) deal with figures

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who subscribed, in various ways and to varying degrees, to versions of atomism. Sander W. de Boer presents the case of an atomist—Gerard of Odo (c. 1285-1349), who considered the problem from a more physicalist and less mathematical perspective. The more famous Nicolas of Autrecourt (c. 1299-c. 1369) forms the subject of chapter 6, authored by Christophe Grellard, whose account clarifies that Nicolas’ atomism had less to do with the conceptual problem of continuum than with finding a “mechanical and reductionist answer to the problem of generation and corruption and, finally, to the question of the eternity of things in the world.” (p. 107). In this sense, his atomism is more physical and qualitative. Grellard explores Nicolas’ atomism against a rich contextual web of the manifestations relating to issues like void or composition. In chapter 7, Aurélien Robert discusses Oxford Dominican friar William Crathorn, arguing for the singularity and originality of his atomistic position. In Chapter 8, Jean Celeyrette reconstructs and contextualizes a little-known dispute (c. 1335) between John Buridan and Michel of Montecalerio over the ontological status of points. This discussion too showcases the significance of physicalist approaches to atomism and related problems in medieval natural philosophy. Closing the book, Joël Biard’s assessment of Blasius of Parma (c. 1345-1416), in chapter 9, shows that “at the end of the century, atomist solutions were still more or less present as a convenient answer in some context between mathematics and physics.” (p. 14). Yet in another sense, the case of Blasius underlines the increasing malleability of the category of late medieval (and subsequently early modern) ‘atomism’, at the confluence of various tensions such as mathematics-versus-physics, quantity-versus-quality, or indivisibilism-versus-minimalism.

All in all, the book is a collection of solid contributions on the complex subject of late medieval atomism and its vicissitudes. It is well organized and structured, the introduction is helpful, and the various chapters are of fairly similar quality, all being informative and well researched. As such, it is a welcome addition and arguably the best

contribution to this field of study since the important *Late Medieval and Early Modern Corpuscular Theories*, C. Luthy, J. E. Murdoch, W. R. Newman, eds. Leiden: Brill, 2001. Unlike the latter, the present collection is likely to appeal to a narrower audience of specialists. Granted that the subject has been framed in quite a specific manner and despite the editors’ effort to engage with the greater context of contemporary natural philosophy and theology, the studies remain somewhat disjointed. This seeming lack of cohesion is due in part to the chapters’ focus on individual case-studies but it also echoes the state of scholarship in the field, serving as a reminder of the many exciting prospects for future study. The book should be of interest to all historians and philosophers of medieval science and theology as well as to historians of medieval philosophy and ideas.

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***Newton as Philosopher.* Andrew Janiak. Cambridge University Press: Cambridge and New York, 2008, 196 pp. Hardcover (\$90, ISBN 978-0521862868).**

Andrew Janiak takes Newton’s distinctive philosophical achievement to be his conception of the relationship between physics and metaphysics. In Janiak’s first chapter (an explicit defense of “the very idea” of Newton as philosopher), he maintains that this entitles Newton to a place in the history of philosophy, although Newton’s originality and ambition are limited: the concepts in which his metaphysics is couched are inherited (primarily from Descartes), and (unlike such contemporaries as Spinoza and Hobbes) Newton never integrates them into a system. Nor, in the passages cited by Janiak, does he frame or address challenges to the possibility of knowledge.

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In the second chapter, Janiak presents two foils for his own interpretation of Newton. The first understands Newton's avoidance of hypotheses as a program for detaching physical inquiry from metaphysical speculation. Janiak sees it as characteristic of this approach, which he finds in "various writers beginning already in the eighteenth century and continuing well into the twentieth",<sup>1</sup> to discount Newton's pronouncements on ontological topics as mere "historical residue" (12). The second, exemplified by the work of Howard Stein and Robert DiSalle, sees Newton as weighing in on just those metaphysical questions that can be answered by empirical research. Janiak finds it correct that on Newton's view, the fundamental powers of natural things are fixed and demonstrated by the success of physical theory. Chapters 3 and 4 make precise the sense in which certain questions of ontology become empirical for Newton. But Janiak maintains that Newton's view is shaped by prior conceptions of substance and causality that apply to God as well as finite things, and could not be overturned by developments in science. This conceptual framework is set out in the final two chapters.

According to Janiak, Newton holds that gravity exists and is the cause of various natural phenomena. His grounds for considering force and mass to belong to the physical world is that they are measured by procedures carried out on "other, obviously physical, quantities" (60). An undoubted highlight of the book is Janiak's delineation of the many facets of seventeenth-century mechanist thought, and his understanding of Newton's challenge to mechanism is correspondingly subtle and rich. Newton intends to leave open whether gravity belongs to bodies, or to a distinct substance serving as the medium for all gravitational interaction. (To make clear how Newton can claim that something exists without fixing its ontological category, Janiak compares his view of gravity to his early treatment of light. This is intended to correct the way in which the account of light has been taken to demonstrate avoidance of metaphysical commitment.) Moreover, Newton accepts the dictum that only local action is intelligible.

According to Janiak, Newton departs from mechanism in not requiring action to be localized to the *surfaces* of bodies, and in recognizing mass as a fundamental property of body not reducible to size, shape, motion and impenetrability.

While this understanding of Newton's view originates with Janiak, he takes himself to follow the approach of Stein and DiSalle. Newton's acceptance of non-mechanical causation is empirically grounded insofar as the attribution of mass to bodies explains the fact that all terrestrial bodies accelerate towards Earth at the same rate (127-9), and insofar as weight is a measure of mass. Yet Janiak maintains that Newton does not share the mechanist (broadly, Lockean) aim of explaining all properties of body on the basis of those perceived in ordinary experience. According to Janiak, Newton conceives mass as the cause of resistance to acceleration, and theoretical sophistication is required to distinguish this effect from resistance to motion, as well as to distinguish the intrinsic property of mass from the extrinsic property of weight. Janiak suggests that the making of these distinctions is an instance of the "refinement and revision" to which knowledge of natural things (the "mundane" portion of metaphysics) is always subject. Other examples of making "conclusions about phenomena" more precise are the determination of degrees of accuracy and the inclusion of newly discovered exceptions (42-3).

Janiak insists that this reconception of metaphysics is embedded in a background theory that is not empirical in this sense: a body of knowledge about God that is not subject to revision. The planks of Newton's "divine metaphysics", as Janiak understands it, are the nature of God's causality and God's relationship to space and time. They are intimately related. According to Janiak, Newton maintains that God, like bodies, can act only on what is spatially present. Janiak stresses that Newton's conception of absolute space and rejection of action at a distance are made necessary by his understanding of God's causality, as they are not required for his physics. However, Newton's view

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(in the *Principia*'s General Scholium) that God "constitutes duration and space" by enduring always and being present everywhere guarantees that God can be regarded as the agent that mediates gravitational interaction, if no suitable medium is discovered by natural science. In Chapter 5, Janiak argues that Newton's view of God's relationship to space is neither empirical nor theologically based. He examines the undated manuscript *De Gravitatione* to show that on Newton's "analysis of what it means to exist", "for something to exist is just for [it] to occupy space and time" (148), so that God's existence and that of space mutually entail each other. Chapter 6 argues that while Newton's surpassing concern with God's causality appears atavistic in hindsight, in his own context his view was revolutionary. Janiak explains that the analogy Newton draws between the relation of mind to body and that of God to creation affords some understanding of God within natural philosophy, but only by abandoning Cartesian substance-dualism.

Janiak makes very effective use of Newton's correspondence with Bentley and Cotes to show that he regarded the impossibility of bodies' acting at a distance as a conceptual truth, which the development of physical theory could not affect. This seems decisive against the view that for Newton, metaphysics simply follows the dictates of physics. By looking beyond empirical science and theology for the roots of Newton's views, Janiak opens up rich territory for scholars of early modern philosophy. These achievements far outweigh any imperfections in his positive account of Newton's thought. Nonetheless, I believe it would strengthen Janiak's treatment to show more of the scaffolding on which the conclusions of divine metaphysics rest.

By this, I mean in part that some of Janiak's claims require more textual support. For instance, although Newton clearly construes God's omnipresence very concretely, it is not so clear that he takes God's literal presence to be *required for his causality* (a view which Janiak himself styles as a radical departure). According to Janiak, Newton rules out

non-local action by God when he charges that on Leibniz's view God "cannot do anything within the bounds of the world, except by an incredible miracle", because Leibniz conceives God not as "omnipresent" but as "an intelligence above the bounds of the world" (Newton (2004), 125). But the doctrine of Leibniz's that threatens to "exclude God out of the world", according to Newton's spokesman Clarke, is rather that "the course of the world can go on without [God's] continual direction" (First Letter, §4). In his own diatribe, Newton does not claim explicitly that the "bounds" on the exercise of God's causality are spatiotemporal. And to assume that they are would beg the question against Leibniz, who holds the traditional view that God is present to things by his power to act on them: "by essence" (as Leibniz puts it in his second letter to Clarke), insofar as God's "presence is manifested by his immediate operation" (§12). To be sure, Newton may find this notion of "presence" unintelligible. Certain passages suggest as much.<sup>1</sup> The point is that Janiak does not mobilize them.

More questionable is Janiak's account of how spatiality is shown to be implicated in the concept of existence (as it applies to both finite substances and God). Here a key text is Newton's claim in *De Gravitatione* that because "space is an affection of being *qua* being", "it follows that space is an emanative effect of the first existing being" (Newton (2004), 25). Janiak (following Stein) takes Newton to mean that space is an emanative effect of whatever being happens to exist first. Janiak concludes that the "emanation thesis" expresses ontic dependence, rather than efficient causation. (For if emanation were efficient causation, any being could be the cause of space). However, one might like more evidence that Newton was interested in the prospect of anything's existing without God (whose necessity Newton grants). In this case, I am not confident Janiak's reading is borne out by the text. Janiak's sparse attention to the neo-Platonic context contrasts markedly with his careful and insightful treatment of mechanism, and he appears to overlook

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evidence that Newton follows this tradition in using “first existing being” to refer to God alone.<sup>1</sup> Janiak argues that the identification of space as an emanative effect is “glossed” by the clause that immediately follows it—“for if any being is posited, space is posited”—which concerns any being whatsoever, not specifically God. However, the clause about “positing” cannot be assumed to restate the emanation thesis, for elsewhere Newton pairs claims about space’s relation to finite beings with theses that are clearly restricted to God.<sup>1</sup>

To display more of the analysis on which Newton’s core metaphysics rests would not just confirm that the latter is not motivated by theology or empirical science. If it shed light on the scope and limits of Newton’s innovation, it would strengthen Janiak’s interpretation in a substantive respect, by showing how to reconcile tensions between the novel and traditional elements of divine metaphysics. How does Newton conclude, for instance, that God “acts locally, just as every other substance does” (166), while continuing to conceive God as “an infinite substance that causes phenomena in a way that is fundamentally distinct from any other causation within nature” (175)?

Of course, it may be that Newton himself gives no further account of the basis for his metaphysics. He would then be strikingly detached from the epistemological concerns that drove his contemporaries. So while Janiak’s Newton may be one-sided as a philosopher, he nonetheless occupies a fascinating corner of the early modern philosophical landscape.

<sup>1</sup> Janiak names Max Jammer, I. Bernard Cohen, and P. M. Harman as recent practitioners of this approach. It is not clear to what extent he finds it in studies of Newton’s metaphysics by Gerd Buchdahl, E. A. Burtt, François de Gandt, or E. W. Strong—who are barely or not at all mentioned—or Alexandre Koyré or Ernan McMullin, with whom Janiak expresses substantial agreement. The narrowness of Janiak’s engagement with twentieth-century scholarship is noted by Richard Arthur in his

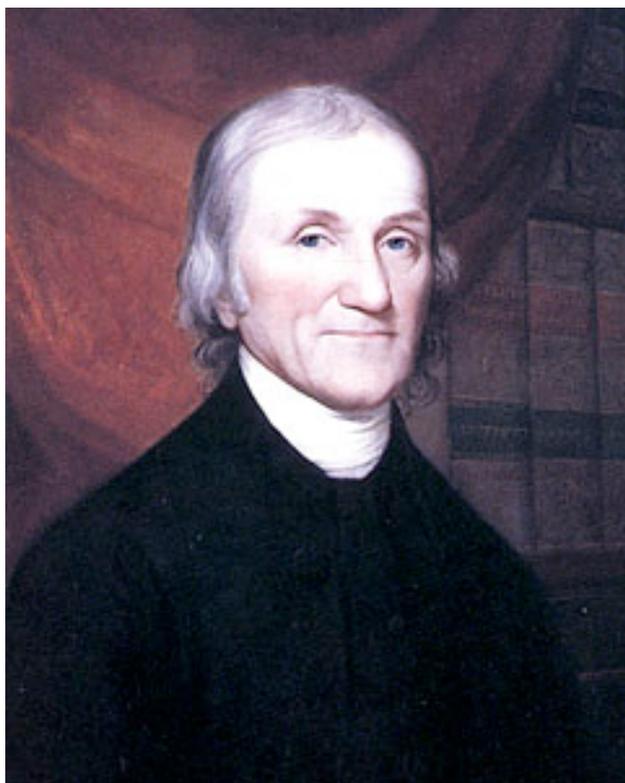
review for *Notre Dame Philosophical Reviews* <<http://ndpr.nd.edu/review.cfm?id=15088>>.

<sup>2</sup> In the manuscript “Tempus et Locus” (published in J. E. McGuire, “Newton on Place, Time, and God: An Unpublished Source”, *British Journal for the History of Science* 11 (1978): 114-129), Newton claims that all things are “in place as regards amplitude of presence” (117). And in a portion of the *Principia*’s General Scholium not quoted by Janiak, Newton asserts that God “is omnipresent not only *virtually* but also substantially; for action requires substance” (Newton (2004), 91)). This is especially favorable to Janiak’s interpretation if he is right that for Newton, “all substances are physical” (164).

<sup>3</sup> See Slowik, “Newton’s Neo-Platonic Ontology of Space”, at <<http://philsci-archive.pitt.edu/archive/00004184/>>.

<sup>4</sup> One example comes earlier in *De Gravitatione*: space is “as it were an emanative effect of God and an affection of every kind of being” (21). Another is in Newton’s drafts for the Des Maizeaux edition of the Leibniz-Clarke correspondence: “infinite space or Immensity & endless duration or Eternity” are “modes of existence in all beings, & unbounded *modes* & consequences of the existence of a substance which is really necessarily & substantially Omnipresent & Eternal” (in A. Koyré and I. B. Cohen, “Newton and the Leibniz-Clarke Correspondence”, *Archives internationales d’histoire des sciences* 15 (1962), 96-7).

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**Joseph Priestley  
(1733-1804)**

***The Invention of Air: A Story of Science, Faith, Revolution, and the Birth of America.* Steven Johnson. Penguin Riverhead: New York, 2008. Paperback (\$16, ISBN 978-1594488528).**

***Joseph Priestley: Scientist, Philosopher, and Theologian.* Isabel Rivers and David L. Wykes, editors. Oxford University Press: Oxford, 2008. Hardcover (\$90, ISBN 978-0199215300).**

Joseph Priestley (1733-1804), now known mainly as the unwitting discoverer of oxygen, was probably the most important if not most influential English-speaking intellectual of the 18<sup>th</sup> century. He was certainly the most interesting. (In making these claims, I mean to include Berkeley and Hume, but not Locke, as 18<sup>th</sup> century figures.) However, like so many intellectuals, Priestley is remembered, if at all, in fragments – more often for the extremism, oddity,

or sheer error of his views than their actual content, import, or impact. Nevertheless, over the years there has been a small but steady stream of scholarship relating to Priestley's career, typically in search of an elusive underlying unity. John McEvoy and Robert Schofield have been the most distinguished contemporary contributors to this task.

Despite his prodigious output, no single work of Priestley's captures the full measure of his thought. His more scientific works are either advocacy histories or idiosyncratic phenomenologies, while his more philosophical and theological tracts were typically dashed off in response to controversies of the day. These literary features have seriously impeded Priestley's reception in our own time, when works are expected to slot into pre-ordained disciplinary categories and, in particular, 'philosophical' works are expected to be pitched at a level that errs on the side of making one's reasoning too explicit (even if boring to the original readers) and one's target too implicit (even if confusing to the original readers). Thus, one's arguments can be examined in suspended animation. Priestley defied posterity – so far to his disadvantage – by communicating to his target audiences as directly as possible. The two books under review aim to redress the balance at both ends of today's reading public.

Johnson's is a popular history that has succeeded in bringing Priestley to the attention of readers of *The New York Times Book Review* (2 January 2009). The author consulted archives on both sides of the Atlantic and routinely grounds his narrative in bits of correspondence that provide glimpses into why so many intellectuals, politicians, and journalists took Priestley so seriously even as they denounced him for unconscionable radicalism. (For example, Priestley supported the French Revolution partly to inspire a similar republican outbreak in Britain.) The book focuses much more on Priestley the natural and political philosopher than the theologian.

Although Priestley, no less than Newton, embedded

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his scientific investigations in a Biblically inspired metaphysical framework, the character of Priestley's theology is not as attractive today as it was, say, 150 years ago. Whereas Newton continues to intrigue readers with his behind-the-scenes attempts to divine the nature of physical reality from the pages of Scripture, Priestley disturbs the average churchgoer with his relentless attack on ecclesiastical authorities of all denominations. Yet, the theological position of the two figures was largely the same, Unitarianism, which effectively carried the Protestant Reformation to its logical conclusion by removing the last vestige of mediation between God and humanity, to wit, the doctrine of the Holy Trinity. The difference between Newton and Priestley was largely a matter of style that reflected the difference that a hundred years made: What Newton had to do in secret, Priestley did very much in the open – though admittedly it resulted in the torching of his Birmingham home and consequent exile to rural central Pennsylvania.

Johnson's narrative is centred on Priestley's long-standing friendship with the US founding fathers, especially Benjamin Franklin and Thomas Jefferson, whose intellectual profiles resembled Priestley's own, even down to the fondness for alcohol and caffeine – the recurrence of which in this story would be worthy of treatment by a 'neurohistorian'. Priestley's pioneering *History and Present State of Electricity* (1767) was responsible for manufacturing the image of Franklin's kite flying as the moment when humanity finally harnessed electricity from the heavens. Later Priestley would prod Jefferson to produce a version of the New Testament that stripped the life of Jesus of all superstitious elements – resulting in a devotional text the size of a long pamphlet. In return, Jefferson helped to provide safe passage for Priestley to the United States, where he turned down the opportunity to be the founding chair of the University of Pennsylvania's chemistry department in favour of railing against the newly passed Alien and Sedition Acts, which threatened to undermine the civil liberties on which the new nation was based. (Jenny Graham, in chapter seven

of *Joseph Priestley*, embeds this closing episode of his life in the relevant scholarly literature.)

While dutifully recounting Priestley's rivalrous correspondence with Lavoisier over the explanation of 'dephlogisticated air', Johnson casts a fresh eye on what was at stake for Priestley. Rather than seeking to identify the elements that might establish the foundations of a new science of chemistry (which is what Lavoisier thought he was doing), Priestley understood his experimental isolation of oxygen as a refinement of the earth's raw materials, a technological innovation consonant with what we would nowadays call 'natural capitalism', whereby the most efficient mode of production is also the one that leaves the world in ecological balance. Here Johnson deftly connects Priestley's interest in the elixir-like qualities of oxygen – marketed in the 19<sup>th</sup> century as soda water – with his discovery of the carbon cycle in photosynthesis. From a public relations standpoint, Priestley had re-branded plant life from passive ingestors of soil nutrients to active manufacturers of a key environmental condition that enables all life to flourish. Given the scientific honours bestowed in his lifetime (despite his radical politics), Priestley's revisionist approach to plants should perhaps be seen as comparable to evolutionary psychologists who today claim to have demonstrated that animals display forms of cognition above mere sentience.

Perhaps surprisingly for a popular work, *The Invention of Air* provides clues for piecing together Priestley's scientific world-view, which may be encapsulated as follows: A providentialist natural theology supplies the explanatory framework within which what would be normally called scientific discoveries are understood as prototypes of technologies through which our own godlike creative powers enable us to perfect the divine plan - which is to bring about 'a heaven on earth'. The view is not unfairly called 'Christian Materialism', and resonates strongly with the Mormon idea that

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humans are potentially ‘latter-day saints’. (Both Priestley and Mormons share a literalist interpretation in the Resurrection of Jesus, which they then seek to understand scientifically.) Put this way, it is not surprising that Friedrich Engels, in *Ludwig Feuerbach and the End of Classical German Philosophy*, regarded Priestley as a truer precursor to his own brand of historical materialism than French *philosophes* like Baron D’Holbach who appealed to our material nature as Epicurus might – that is, to negate the prospect of self-transcendence. Paradoxically perhaps, Priestley appeared to capture the ‘spirit’ of the Marxist project much better than the atheistic materialists of his day.

The essays collected in *Joseph Priestley* are largely by and for specialists in this particular figure, though it would do the most good in the hands of those seeking general guidance in how it has been possible to seek God through science and thereby provide meaning to the human condition. While this broader concern seeps through most of the essays, they are written in the spirit of scholarly apologetics for devoting so much attention to such an outlier from the canonical narrative of the history of modern philosophy, science, and culture more generally. Priestley’s outlier status is ultimately grounded in his refusal to draw sharp boundaries between various bodies of knowledge that in the modern era have become increasingly distinct – say, philosophy, science, politics, and theology.

This point comes out most clearly in Alison Kennedy’s essay (chapter six) in *Joseph Priestley*, which focuses on Priestley’s *Lectures on History and General Policy* (1788), which drew on courses he gave at Warrington Academy, a school for religious dissenters near Manchester with which Priestley was associated from 1765 to his emigration to the United States in 1794. Its pupils included Thomas Malthus and Christian Carl André, a naturalist who went on to found the Moravian Academy of Sciences in the Hapsburg Manchester, Brno, later home to one Gregor Mendel, who

leveraged Priestley’s ‘natural capitalist’ views of plants into the first modern scientific theory of heredity.

Priestley’s pedagogical innovations were so fundamental that their radical character in late 18<sup>th</sup> century Britain can be easily overlooked today. He had students learn about the nature of language by studying English grammar, rather than Latin or Greek. He put modern history on the curriculum when only classical history had been taught. Moreover, Priestley urged a forensic approach to historiography – to wit, that the original documents and artefacts (‘material evidence’) be consulted whenever possible. Priestley’s clear target here was Edward Gibbon, whose magisterial *Decline and Fall of the Roman Empire* (1768) was, in effect, a very learned allegory that constructed from a critical reading of classical sources for purposes of offering moral instruction to the present, given what Gibbon presumed to be recurrent tendencies in human nature. Such ‘philosophical history’ was standard fare at the time, with Gibbon distinguished simply by his narrative’s anti-Christian undertow. For his part, Priestley, shared neither Gibbon’s cyclical view of history nor his tendency to use the past as a pretext for talking about the present. After all, if history is heading in some providential direction, as Priestley thought, then the past should not cast such a heavy shadow on our understanding of the present. Indeed, the past may tell us more about the errors we have made (and hence should avoid) rather than where we are heading.

In today’s terms, Priestley might be seen as akin to those in cultural studies who are less concerned with the scholarly authority of historical sources than their proximity to the events that one seeks to understand. In this context, journalistic accounts and popular representations become epistemically luminous. Other aspects of Priestley’s pedagogy pointed in this direction. He famously introduced time-lines into the teaching of history but less well known is that he selected and arranged historical

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personages on the basis of fame rather than merit, since (according to Priestley) judgements of the former tend to be more informative than those of the latter. Equally remarkable for his time, when experimentation still appeared to be a somewhat esoteric way of obtain knowledge, Priestley encouraged children to play with scientific apparatus and then reflect on how their discoveries reflected the overall design of nature. He was more interested in children learning to see nature's order in the artifice of the laboratory than the actual correctness of their conclusions. Little surprise, then, that Priestley disapproved of Hume's sceptical *Dialogues concerning Natural Religion*, given their ambiguously negative stance on the scientific detectability of design in nature.

The two philosophically meatiest essays in *Joseph Priestley* are by William Brock (chapter two) and James Dybikowski (chapter three). They centre on the vexing question of whether there is a unifying principle to Priestley's thought. Broadly speaking, Brock says no and Dybikowski yes. It is clear that like the other great polymaths of history – and Priestley is neatly placed in in terms of interests, disposition and chronology somewhere between Leibniz and Goethe – he spread himself too thin. Nevertheless, Priestley's centrifugal tendencies were held together by a commitment to the specific brand of associationist psychology that he had inherited from the physician-turned-dissenting-minister, David Hartley, whose *Observations on Man* (1749) Priestley abridged and edited for late 18<sup>th</sup> century publication.

Hartley radicalised the empiricism of John Locke, himself a trained physician of nonconformist religious leanings. Indeed, he offered the first systematic neuroscientific account of mental life by accounting for the centrality of ideas in Locke's epistemology in terms of the summation of nerve vibrations distributed throughout the body. Most significantly, Priestley adopted from Hartley the principle that mental association is governed by the

contiguity, not the similarity, of nerve impulses. Accordingly, ideas are synthetic products of fused impulses, an image that the German philosophical tradition would later use to model dialectical processes both within and between humans. It is clear that Priestley himself already envisaged associations at multiple levels. His Warrington curriculum fostered associations between reading and pleasure, while he promoted the free transit of ideas among mature individuals as eventuating in an improved collective intelligence – what Hegel and his Marxist followers subsequently identified as the conversion of quantitative to qualitative change. Priestley even anticipated Marx's view of the politically revolutionary potential of this transition.

With the benefit of hindsight, Priestley's optimism appeared to presume that a sufficient number of properly educated people could reverse the statistical tendency of societies "regressing to the mean" by exemplifying how one resolves disparate considerations for oneself. The preference for contiguity over similarity as the principle of association presupposed that if people are not specifically encouraged to interrelate their own personal experiences for purposes of public expression, they might simply copy the self-expression of dominant members of their society. From an associationist standpoint, it would mean that other people's experience had colonised their own minds – perhaps to such an extent that one's own lived experiences are systematically discounted in public self-representations. Priestley quite reasonably wondered how such a regime of self-censorship could promote the search for truth. He wanted individuals to learn how to make trade-offs for themselves without expecting that, under similar circumstances, others they would make the same trade-offs. This talk of trade-offs serves as a reminder that for Priestley an educationally enhanced commercial ethic provided a better guide to citizenship than simple obedience to established political authorities.

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Let me conclude by observing that Priestley enjoyed enormous respect on both sides of the Atlantic in the first 150 years following his death. He was routinely regarded as not only the discoverer of the oxygen but also an icon for the wide-ranging citizen-scientist, which suited the self-image of chemists throughout the 19<sup>th</sup> and early 20<sup>th</sup> century. However, all of this changed with fellow chemist James Bryant Conant's famed case histories in the historical of the experimental sciences, which formed the basis of the postwar Harvard General Education in Natural Science course in which one Thomas Kuhn served as teaching assistant. Conant and Kuhn (in *The Structure of Scientific Revolutions*) placed a canonical stamp on Lavoisier's victory over Priestley for the discovery of oxygen, something that until then had been subject to much contestation. It is difficult to resist the view that Priestley's explicit marginalisation was intimately connected to his refusal to disentangle his 'science' from his radical politics and theology. In that Cold War context, Priestley had the audacity to suggest – in both word and deed – that the pursuit of science could constitute an all-encompassing lifestyle that as a matter of principle shuns service to established authorities.

Both books are worth reading deeply in search of the example that Priestley was trying to set.

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**Carnap's *Logical Syntax of Language*. Pierre Wagner, editor. Palgrave Macmillan: New York, 2009. 304 pp. Hardcover (\$85, ISBN 978-0230201514).**

The *Logical Syntax of Language*, originally published in 1934, was one of Carnap's major works, and can be seen as both a transitional point in his thinking and one of the first articulations of his mature views.

Carnap's *Logical Syntax of Language*, edited by Pierre Wagner, is a collection of essays whose principal focus is the *Logical Syntax* itself, situating it within Carnap's thought, as well as in analytic philosophy more generally. Some of these papers consider the *Logical Syntax* in its historical context, discussing its connections to and receptions by other Vienna Circle thinkers such as Schlick and Neurath, as well as other important philosophical figures such as Wittgenstein and Quine. Others focus on its more technical aspects. Among the technical contributions, the papers by Philippe de Rouilhan and Dennis Bonnay discuss Carnap's definitions of logical consequence and logical expressions, respectively.

However, what is most striking about this collection is its illustration of the way in which so many different aspects of the *Logical Syntax* are related to the principle of tolerance, first articulated in this work: *In logic, there are no morals*. Everyone is at liberty to build up his own logic, i.e. his own form of language, as he wishes. All that is required for him is that, if he wishes to discuss it, he must state his methods clearly, and give syntactical rules instead of philosophical arguments.

For instance, Steve Awodey and Andre Carus connect Carnap's transition to the metalogical point of view of Logical Syntax, to his adoption of the principle of tolerance. Such a transition was criticized on Wittgensteinian grounds by some members of the Vienna Circle, notably Schlick, but welcomed by others, such as Hahn and Neurath. Thomas Uebel's paper points out ways in which the pluralism represented by tolerance elicited this positive reception---a stance arguably anticipated by Hahn, but which certainly became central to Carnap's views.

Another aspect of Carnap's thought discussed in this collection is his relationship to traditional philosophy and his well-known rejection of metaphysics. While Carnap does target thinkers such

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as Heidegger and Hegel in his dismissal of metaphysics, theirs are not the viewpoints criticized in *Logical Syntax* as putting forward pseudo-sentences. Rather, among the most prominent examples of pseudo-sentences Carnap gives are sentences such as “5 is a number”; the debates being criticised are those taking place in the philosophy of mathematics. Pierre Wagner's chapter gives an exposition of Carnap's criticism of such debates. The chapter by Warren Goldfarb considers Carnap's relationship to these foundational debates more explicitly, by considering the ways in which Carnap's own views on these subjects changed along with his shift towards the pluralism expressed in *Logical Syntax*. Unsurprisingly, as Carnap studied logic with Frege, during the pre-*Syntax* period Carnap's view looks to be a traditionally logicist one, which is clearly not the view put forward in *Logical Syntax*. While the *Syntax* view can also be seen as logicist, he no longer agrees with Frege's logical monism, and thereby has a new perspective on the debates in the foundations of mathematics. Given the principle of tolerance, the goal is not to reconcile competing views, but to provide a means through which the technical advantages of each one can be exhibited.

The extent to which tolerance reaches raises some interesting questions, however. For instance, Jacques Bouveresse argues for a fairly far-reaching interpretation of Carnap's tolerance that has the worrying consequence of bringing Carnap's view very close to philosophical quietism. Bouveresse argues that Carnap's view is so radically anti-dogmatic that even the anti-metaphysical stance cannot be a prohibition. In contrast, a more positive role for the principle is argued for in Richard Creath's paper, which discusses the relationship between the principle of tolerance and the social progressiveness of the left wing of the Vienna Circle, and outlines a way in which the principle can be used to defend an empiricist point of view. While this latter point may seem surprising, as tolerance may seem to suggest accepting even undesirable philosophical

views, Creath points out how treating empiricism as a convention allows for its defense in a non-dogmatic and non-question-begging fashion.

The final two papers in the collection connect the principle of tolerance to the concept of analyticity, a key point of contention in the well-known disagreement between Carnap and Quine. Thomas Ricketts' paper is certainly not the first to discuss the striking similarities between Carnap and Quine's views---a point which Ricketts himself acknowledges as he opens with a quote by Burton Dreben, calling Quine's *Word and Object* the “mirror-image of Carnap's philosophy.” Ricketts' contribution is to pinpoint the differences between Carnap and Quine in their differing views about the relationship between logical and colloquial language. Quine rejects there being a sharp distinction between the two, which Ricketts uses to explain why Quine's criticisms of analyticity do not always seem to line up clearly with what Carnap wrote about the subject. Connecting together several themes, then, Michael Friedman's paper aims to tie together the concepts of analyticity, empiricism, and tolerance, and to show how they are distinctively combined in Carnap's philosophy. The combination of analyticity and empiricism, Friedman argues, can be seen in Carnap's viewing interpreted mathematics as a tool for scientific inquiry. Tolerance, for its part, plays a role in transforming problems of the foundations of mathematics into problems of expedience (an endeavor which Friedman regards as more promising in this paper than he did in his earlier *Reconsidering Logical Positivism*). The result of combining these views in Carnap's distinctive fashion provides his pluralistic approach to problems in the foundations of logic and mathematics, as well as his anti-dogmatic stance against prohibitions which do not take into account the practical merits of proposals.

In general, the papers in this collection have something to offer readers interested in a variety of topics. While they focus on Carnap's *Logical Syntax*

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of *Language*, broader-reaching connections are also made between Carnap and important figures in the history of analytic philosophy, such as Frege, Wittgenstein, Tarski, and Quine. Those interested in the debates in the foundations of mathematics will also find much of interest in Carnap's pluralistic approach to these issues. This collection, then, provides a perspective on more than just the *Logical Syntax of Language* itself, but also on its role in Carnap's overall thought, and the connections between his views and other important topics in analytic philosophy.

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***Science vs. Religion?: Intelligent Design and the Problem of Evolution.* Steve Fuller. Polity Press: Cambridge, 2007. Paperback (\$20, ISBN 978-0745641225).**

In his book *Science vs. Religion?*, Steve Fuller attempts to open and pursue a rather unique avenue of thought in the 'Evolution vs. Intelligent Design' debate. Ultimately, his claim is that evolutionary theory has not been adequately challenged and that – at the same time – important metaphysical aspects of cosmological design, articulated in Intelligent Design Theory (IDT), have been unjustifiably dismissed from the scientific conversation.

Fuller adopts a traditional understanding of science and religion that, simply stated, holds them to be two “different kinds of concepts.” That is to say, both science and religion each have their own epistemic domains. Because he holds that these domains are not mutually exclusive, there is the possibility of combining the two categories. This is a foundational concept for the reoccurring theme throughout the book, namely that religious ideas in science are not necessarily problematic. He draws support for this theme from several ideas. One such idea is that there

is a strong historical relationship between religion and science. Interestingly, unlike such writers as Discovery Center Institute fellows Nancy Pearcey and Charles Thaxton, Fuller pays relatively little attention to the influence of religious thought on the idea of scientific natural law. Instead, he focuses on the influence of religious thought on the idea of human sacredness, citing Thomas Huxley as a source of this idea in scientific thought. While the idea of shifting the focus to a more anthropocentric direction has value, there is a problem in the lack of historical evidence to support Fuller's position.

It is also interesting to note that Fuller traces the “culture war” between religion and science back to the controversial storm Darwin created with the 1859 publication of *Origin of Species*. Fuller claims that the two sides of this war can be identified as those who agreed with Darwin that nature could be explained without reference to the supernatural on one side, and those who insisted that a supernatural element of nature be maintained on the other side. He takes this conversation to be a final integral factor in the controversy between Church and State at the time. Elsewhere, scholars such as David Lindberg, Robert Westfall, and Ron Numbers trace this “culture war” (also known as the Conflict Thesis) back to the 1874 work of John William Draper entitled *History of the Conflict Between Religion and Science* and the 1896 work of Andrew Dickson White entitled *A History of the Warfare of Science with Theology in Christendom*. Fuller briefly mentions both of these texts, but there are two points worth noting. The first is that he fails to cite them as the source of the idea of the intellectual and culture war between religion and science. Second, and perhaps more importantly, he fails to mention a critical point – that this hostile understanding of the historical relationship between religion and science has largely been discredited by contemporary scholarship.

Fuller admits to a myriad of ideas constituting the idea of creationism, and although he states that

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adherents of Darwinism are often at fault for misunderstanding their creationist opponents' position, he fails to give more than a cursory treatment of the term. He contrasts creationism with intelligent design, maintaining that the latter can be understood in terms of "mind-like" creationism. That is to say, that intelligent design entails an understanding that nature has been designed by a mind and thus can be interpreted by a mind – science interprets nature in accordance with the capacity of the human mind, thereby reflecting the construction of nature by a divine mind. Fuller then goes on to make the claim that this basic understanding of nature can be maintained from within a Darwinist standpoint, if one merely acknowledges the profound mysterious nature of the mind of God thereby granting the Divine to be the source of randomness of evolution.

According to Fuller, the chief ideological issue in intelligent design/evolution debates concerns humanity, and he uses the second chapter of *Science vs Religion?* to elaborate on this idea. Humanity is defined as being "properties that all human beings possess either individually or collectively" which essentially serve to define our species. From here, he introduces a multitude of historical and contemporary perspectives on what it means to be human, ranging from social contract theorists, to contemporary academics, to Jesus of Nazareth. Fuller then draws on a multitude of conversations; animal rights, artificial intelligence, and even prosthetic technology are used as examples of topics that focus on the ideology of humanity. While it is admirable to want to bring to the table a broad range of perspectives, there is the inevitable problem of sacrificing quality of ideas for quantity of ideas. Due largely to the fact of presenting so much information, Fuller fails to make a clear and coherent argument for the ideological issue that exists specifically at the interface between intelligent design and evolution. Instead, he presents an unclear jumble of disparate ideas that lack continuity and make deciphering

his understanding of how exactly the ideal of humanity is treated by both IDT and evolution theory impossible. In what can be seen as an attempt to focus his discussion on the ideal of humanity as it pertains specifically to intelligent design, Fuller abruptly abandons his task of articulating various meanings of humanity in political philosophy, psychology, and theology and turns instead to a convoluted discussion of more than a dozen different scientists, from Newton and Darwin, to Cuvier and Agassiz, to Francis Collins and E.O. Wilson. Again, the sheer volume of different ideas is problematic and prevents one from coming away from the text with any sort of coherent thesis statement.

In the third chapter, Fuller writes that an important tenet of intelligent design theory is the idea that there is nothing in reality that can be said to be naturally complex. Rather, complexity is a property that results from the existence of information being passed between God on the one hand, and humans on the other. This 'information' is what we call the whole of reality, and it is the task of science to understand it. The text does not elaborate on this idea, but instead turns away from IDT's narrow use of complexity to a much less defined understanding of the term. Fuller notes that it is important to understand there there is a distinct difference between complexity and complication, with the later simply being the systematic relationship between parts of a whole. He offers no such explicit clarification for what he means by complexity (or even why he holds its distinction from complication to be important). Fuller then jumps between vague understandings of complexity, none of which engage the aforementioned IDT use of the term. An example of such an understanding is Thomas Kuhn's work on the historical process of science. Fuller takes a bit of liberty with this work when he claims that it is asking whether new scientific paradigms that absorb older theories in new theories constitute a progression, or an increase in the complexity, of science.

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The fourth chapter is where Fuller discusses his participation in an American court case surrounding the issue of whether or not IDT should be taught within the science education curriculum. It is by far the strongest chapter. Here, the legal issues of *Kitzmiller v. Dover Area School District* (argued from September 26, 2005 through November 4, 2005) force him to keep his discussion focused and work with more concrete definitions of his terms. It is in the context of the legal battle that Fuller's main argument can be understood most clearly. His main argument is that science is not monolithic, it is not solely in the lab, it is not naturalistic--science is more than these false purist notions that one may have. The problem with Fuller's work is not that he doesn't accept this understanding of science (many philosophers of science take up this exact argument), rather the problem is that he doesn't argue for his position---he doesn't define his terms, he doesn't lay out the opposition's argument; he doesn't engage in a disciplined conversation which calls into serious question the validity of the popular understanding of science.

Fuller notes that the Constitution of the United States grants local (i.e. state) government jurisdiction over the education system. It is the local government that pays for schools and it is that same local government responsible for setting down the curriculum. He derives two interesting, yet arguably misguided, points from this system. The first is that in such a system where science education is a matter to be decided by the local government, the definition of science becomes one of authoritative knowledge used in the public sphere. This knowledge must be seen as pluralistic in nature, and less focused on one specific method than it is on the interrelated activities of different branches. The second point is that science, rather than being what goes on in the lab, is fundamentally seen to be at the interface of the lab and this public sphere. As with many ideas in his book, Fuller simply states these ideas

without giving them due attention and moves on. Consequently, what could prove to be an interesting and productive conversation stands simply at posited ideas left in an odd paragraph or two.

Fuller goes on to briefly touch on the idea of the relationship between motives and methods in science. He claims that motives dictate method in the case where the methods of science are manipulated in such a way as to reflect a given set of preconceived notions or aims. Without any elaboration, he maintains that should IDT be accepted as science and thus mainstream integrated, the methods of the theory could be properly divorced from any religious motives it may or may not carry. What does this mean? Admittedly, these ideas are unclear and undefined. Fuller fails to define what potential religious motives IDT may have, while at the same time have already stated in previous chapters that IDT has no religious motives.

At the same time as declaring these ideas undefined and underdeveloped, I think within them lies the crux of Fuller's entire overarching argument, that Intelligent Design Theory is a valid scientific theory. I think what Fuller is trying to convey here, is that with the removal of all religious-speak (my words, not Fuller's), from IDT, one would be left with a theory that can be articulated in more traditional science-speak. However, this is one of the many instances where it is clear that Fuller severely understates the role of religious ideas in IDT. Numerous times throughout his work, Fuller treats the theistic ideas within Intelligent Design as mere heuristics instead of the serious metaphysical background against which the entire theory is placed.

Returning to the context of the legal battle, Fuller's position in court was refuting the claim that understanding IDT as a science is not in the best interest of the public, as it would discourage scientific inquiry. Throughout *Science vs. Religion?* Fuller presents IDT as being a theory with

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qualitative and quantitative merit, claiming it to be as scientifically rigorous in its methodology as Darwinism. He claims that this IDT science simply has some metaphysical additions, integrated in such a way as not detract from the scientific credibility of the theory. He repeatedly makes the claim that the scientific method of Intelligent Design is ignored, in large part because of the prejudice that the scientific community displays against the religious ideas the theory entails. Having structured his argument thus, it stands that one defending the validity of the scientific status of IDT would simply have to justify this religious aspect-which is exactly what Fuller proceeds to do. Fuller argues that historically, religious perspectives (particularly the Christian perspective advocating a designed universe) have served to ignite and perpetuate scientific creativity. Consequently, he believes, such perspectives should not be discounted by the contemporary scientific community.

Once again, however, Fuller's oversimplification of the complex historical confrontation between science and religion in the Western intellectual world results in a severe misrepresentation of the scholarship. He tries to portray a direct causal link between the Protestant Reformation, with its biblical literalism that yields an understanding of the universe being created, and the Scientific Revolution which necessarily presupposed such a designed cosmos. Thus, Fuller ignores the fact that the design argument has a long and multi-cultured history, having been circulating at least since the time of Socrates. He goes further in his attempt to illustrate the historical connectivity between religious and scientific ideas throughout his work, by drawing on the religious inclination of historical figures in science, such as Newton. Here, Fuller is guilty of disregarding the fact that in such cases the scientific theory that resulted was conceptually distinct from the personal religious beliefs particular scientists held. To be sure, the Christian worldview very much influenced the historical development of science. But Fuller's

text does not do justice to this historical fact. Nor is it the case that this fact necessitates the contemporary scientific community adopting religious perspectives under the auspices of 'scientific theory.'

In his final pages, Fuller attempts to present a case for the inadequacy of Darwinism, although he does not ultimately offer a coherent rationalization for this conclusion. Instead, he presents a series of random trains of thought, from criticizing Lamarckian ideas that he has attributed to Darwin, to repeatedly stating that the lack of connectivity between the neo-Darwinian synthesis and work done within genetics labs stands as proof of its expendability. He concludes with the idea that in the event of Darwinism being seen as insufficient, there is the potential of the absorption of biology into sociology. It seems, that in these final paragraphs of his work, Fuller has found what he believes to be the path to building a post-Darwinian worldview within the walls of his own discipline, sociology.

As was the case with Intelligent Design Theory, Fuller fails to give any substantial definition of what he means by the term Darwinism. Thus, while it is clear that he is thoroughly dissatisfied with the latter, it is exceedingly difficult to understand what exactly he is arguing against. He unambiguously implies that because biology (and Darwinism in particular) is not monolithic, because it does not conform to Newtonian standards of law-like rigor found in the *Principia*, because there is vast disagreement between scientists in the lab and scientists in the field, and because historically it was late to arrive in formal universities, that its scientific validity is called into question. Fuller fails to develop any sort of argument for this claim, however he proceeds to treat Darwinism, evolution, and natural selection as inadequate metaphysical positions instead of acknowledging them as science and engaging in scientific literature.

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In the end, the potentially interesting questions the Fuller raises are lost in his muddled and unfocused prose. It seems as though, when all has been said, Fuller's primary contention is that the naturalism and materialism that is so predominately featured in contemporary science is metaphysically bankrupt. Darwinism simply stands in as a particular instantiation of a scientific theory to which he can ascribe these naturalistic/materialistic philosophical commitments. Likewise, IDT simply stands in as a particular instantiation of what some would like to argue is a scientific theory, to which can be ascribed a seemingly much more vibrant metaphysical palate. The result is that Fuller ends up more attacking his misguided conception of Darwinism than he is championing his misguided conception of IDT, and in this way does a disservice to both positions. However, the greatest disservice that *Science vs. Religion?* does is to the intricate and complex historical interface of science and religion itself. This is ironic, because it is on this history that Fuller places the weight of his argument for the validity of the claim for IDT to be understood as science. In addition, these historical issues lead Fuller into broader interpretive problems, as when in his concluding remarks he writes that the historic conflict between science and religion has been "more social than cognitive." I am afraid that such a statement could not be more false, and in the case of Darwinism one need only glance at an odd piece of correspondence from the desk of Charles Darwin to be convinced.

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